

Mineralogy of the Mirolitic Cavities of the Granites, Wichita Mountains, Oklahoma

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Mirolitic cavities are common in the Quanah granite of the eastern part of the Wichita Mountains and in the Reformatory and Lugert granites of the western section. These cavities usually are small rarely exceeding five inches in diameter though a few are a foot or more in length. They seem to be most prevalent in hydrothermally altered zones and are separated from the granite proper by a narrow zone of coarse micropegmatite. The cavities are partly or completely filled with minerals. Anderson (1) has described these occurrences and lists the mirolitic cavity minerals as colorless and smoky quartz, feldspar (microcline-perthite), biotite, hematite, opal and calcite. In the Lugert area small crystals of riebeckite and a little asphalt also occur. The purpose of this article is to add the mineral brookite to this list.

The quartz occurs as euhedral crystals usually less than an inch in length, though the soil on Quartz Mountain contains many smoky quartz crystals often six inches long which are residual from the weathering of these cavities. The largest crystal of quartz so far reported in Oklahoma was obtained from a mirolitic cavity in the Government quarry at Lugert; it is smoky quartz and was described by Polk (2) as weighing 75 pounds.

The feldspar is euhedral with crystals rarely exceeding an inch in length, while riebeckite occurs as thin prisms and biotite as small booklets.

Robert Halsted, a geology student, discovered some reddish needles in the mirolitic cavities of specimens from the Government quarry at Lugert. These proved to be brookite which occurs as single or radiate clusters of needles averaging 1 mm. in length, with a reddish color and adamantine luster. Individual cavities contain from one dozen to a few dozen needles. Some of the schiller structure of the hypersthene of troctolite of the Wichita Mountains is due to inclusions of minute needles of a mineral with a very high luster and index of refraction which probably is brookite (3).

Hematite is present in small amounts in the cavities both as a fine powdery material with a reddish color and as black specularite. The latter type occurs as minute specks and as small hemispherical masses, $\frac{1}{2}$ mm. in diameter. The hematite is interpreted as hydrothermal in origin and not the result of surface weathering as inclusions of the iron oxide in smoky quartz indicate that some of the hematite is older than part of the hydrothermal quartz.

The opal is found at the Government quarry. It occurs as colorless botryoidal masses and thin coatings of hyalite which fluoresces a light green when exposed to 2537 A° but has no reaction to the long 3600° waves. The fluorescence is more marked than that of any other mineral so far reported from Oklahoma. Although asphalt is present in some of the cavities of this locality it probably is not the impurity which causes the fluorescence since asphalt reacts to 3600 A°. The opal is considered to have been deposited during the last stages of the cooling of the igeous rock.

Some data are available concerning the age relationship of the minerals in the cavities. The quartz crystals commonly are attached to feldspar surfaces; riebeckite needles are enclosed in smoky quartz; brookite and hematite occur both as inclusions in the quartz and as coatings on the crystal faces of the latter; opal and calcite always coat the other minerals. From these facts the paragenesis of the minerals is interpreted as follows:

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| 1. biotite | 5. quartz |
| 2. microcline-perthite | 6. opal |
| 3. riebeckite | 7. calcite |
| 4. brookite and hematite | |

The microcline-perthite is an injection perthite formed by the hydrothermal replacement of microcline by albite and the latter therefore, is later than the microcline.

REFERENCES

1. ANDERSON, KENNETH. 1946. The occurrence and origin of pegmatites and miarolitic cavities in the Wichita mountain system, Oklahoma. Unpublished master's thesis, University of Oklahoma, Norman.
 2. POLK, T. R. 1948. Large smoky quartz crystals from the Wichita Mountains, Oklahoma. Proc. Oklahoma Acad. Sci. 29: 41.
 3. HUANG, W. T. 1952. Personal Communication.
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